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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/643,961

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Chun Ho Fan

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07/02/2004

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EXAMINER

BEREZNY, NEMA O

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 07/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/643,961

Applicant(s)

FAN ET AL.

Examiner

Nema O Ber zny

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 24-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 08202003,03172004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-23, drawn to a method of making a semiconductor device, classified in class 438, subclass 122.
- II. Claims 24-29, drawn to a semiconductor device, classified in class 257, subclass 712.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by another and materially different process; for instance, said product could be made from individual substrates, rather than singulating the completed product from a larger substrate or wafer of finished products.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Chris Bennett on 6-22-04 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-23. Affirmation of this election must be made by applicant in replying to this Office action. Claims 24-29 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Said claims state that "... collapsible spacer[s] [array] is disposed between and in contact with said heat spreader during molding."

Two objects (said heat spreader and another object) are required for said spacers to be disposed there between. Correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5, 8-17, and 20-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al. (2002/0180035). Huang discloses a process for manufacturing a plurality of integrated circuit packages comprising: mounting a plurality of semiconductor dice (Figs.2A-2G; Fig.4 el.41) to a first surface of a substrate array (el.40); mounting a plurality of die adapters (el.48) to said semiconductor dice such that each one of said die adapters is mounted to a corresponding one of said semiconductor dice; wire bonding (el.42) said semiconductor dice to ones of conductive traces (p.4 para.43) of said substrate array; mounting a collapsible spacer array (el.46) to one of a heat spreader array (el.43), said die adapters, and said substrate array; placing one of said heat spreader array and said substrate array in a mold cavity (Fig.2E; p.3 para.36); releasably clamping the other of said heat spreader array and said substrate array to a first die of said mold such that said collapsible spacer array is disposed between said

heat spreader array and said substrate array (Fig.4; p.3 para.36); molding (el.44) a molding compound in the mold, thereby molding the semiconductor dice, said substrate array, said wire bonds, said die adapters, said collapsible spacer array and said heat spreader array into the molding compound to provide an array of molded packages (Fig.4); forming a plurality of ball grid arrays (el.49) on a second surface of said substrate array, bumps of said ball grid arrays being electrically connected to said conductive traces (p.4 para.43); and singulating each integrated circuit package from said array of molded packages (Fig.2G; p.3 para.38) **[claims 1, 13]**. Huang also discloses wherein said placing one of said heat spreader array and said substrate array in a mold cavity comprises placing said heat spreader array in said mold cavity such that said heat spreader array rests on a lower die of said mold (p.3 para.36; wherein "lower die" and "upper die" are relative to each other) **[claims 2, 14]**; wherein said releasably clamping comprises releasably clamping said substrate array to an upper die of said mold (p.3 para.36; wherein "lower die" and "upper die" are relative to each other) **[claims 3, 15]**; wherein said placing one of said heat spreader array and said substrate array in a mold cavity comprises placing said substrate array in said mold cavity such that said substrate array rests on a lower die of said mold (p.3 para.36; wherein "lower die" and "upper die" are relative to each other) **[claims 4, 16]**; wherein said releasably clamping, comprises releasably clamping said heat spreader array to an upper die of said mold (p.3 para.36; wherein "lower die" and "upper die" are relative to each other) **[claims 5, 17]**; wherein said mounting said collapsible spacer array comprises mounting said collapsible spacer array (el.45) to said substrate array (Fig.4) **[claims 8,**

20]; wherein said mounting said collapsible spacer array comprises mounting said collapsible spacer array (el.46) to said heat spreader array (Fig.4) **[claims 9, 21]**; wherein mounting said collapsible spacer array further comprises mounting a corresponding collapsible spacer of said collapsible spacer array to each of said plurality of die adapters (Fig.4 el.47) **[claim 22]**; wherein said at least one collapsible spacer comprises a plurality of collapsible spacers, and mounting said at least one collapsible spacer comprises mounting one of said plurality of collapsible spacers (el.47) to said die adapter and mounting at least another of said collapsible spacers (el.45) to said substrate (Fig.4) **[claim 10]**; and wherein said collapsible spacer array (el.46) is disposed in contact with said heat spreader during molding (Fig.4) **[claims 11, 12, 23]**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang as applied to claims 1 and 13 above, and further in view of Punzalan et al. (2003/0160309). Huang does not disclose a ground wire bonding said die to said adapter. However, Huang would look to one such as Punzalan for a separate ground attachment from the die attach area because Punzalan discloses wherein said wire

bonding further comprises ground wire bonding (Fig.4 el.27) a die adapter(s) (el.54) to a corresponding semiconductor die/dice (el.12). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the ground wire bonding of Punzalan with the process of Huang in order to provide a ground plane to a semiconductor structure separate from the die attach area (Punzalan - p.4 para.86).

Claims 7 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang as applied to claims 1 and 13 above, and further in view of Cheng et al. (2003/0075812). Huang does not disclose ground wire bonding said die to said substrate. However, Huang would look to one such as Cheng for reducing inductance because Cheng discloses wherein wire bonding further comprises ground wire bonding (Fig.7 el.21a) a semiconductor die/dice (el.10) to a corresponding ground pad (el.30) on a substrate [array] (el.12). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the ground wire bonding of Cheng with the process of Huang in order to reduce the inductance effect (Cheng - p.3 para.42).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nema O Berezny whose telephone number is (571) 272-1686. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NB

Nema Berezny
Nema Berezny